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Guide to the Lichens of the New York Area—Part 2

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Group 4. Lichens more or less stalked, but the stalks and branches (or lobes) having the structure of the Papery Lichens (Groups 5 to 12), showing an upper and an under side different in texture and usually in color.

Some members of this group could easily be placed in Group 5, but in the main, their appearance is intermediate between the Stalked and the Papery Lichens, and they pass between the preceding and following groups in a sort of sequence. The lines of separation, however, between Group 4 and Groups 5 and 6, are arbitrary, not natural. It is simply more convenient to treat them as three groups than as one.

Evernia prunastri. FLABBY LICHEN

Also called *E. thamnodes* or *Letharia thamnodes*.

Evernias are found plentifully in the Catskills and Shawangunks, but seldom on the lower ridges. They vary considerably in form. *E. prunastri* looks like a wilted Ramalina, gray-green or straw-color, and more or less hanging from twigs and branches of trees, or plastered against their bark. It may grow to 10 cm. or more in length, and the wider parts of the branches spread to 5 mm. or more. The upper or outer surface is ridged, and roughened with warty soredia, and with small coral-like outgrowths which often give it a slightly fuzzy appearance, suggesting *E. furfuracea*. The under side is not always apparent, but by looking carefully, parts of the flattened stalk will be seen to have patches of pale, silky under-surface, with ribs and net-like veins, but not roughened.

Fruits, almost never seen, would be brown, cupped disks along the branches, and up to 7 mm. across. Spores, undivided, 5 to 7 by 3 to 4 microns.

Evernia prunastri was once used by the Egyptians in making bread. There is some question whether the plant in the New

York highlands is the same as either *E. prunastri* or *E. thamnodes* of Europe, but Muhlenberg applied the present name, which therefore has the sanction of long use. It is not likely to be confused with any lichen except *Ramalina*, from which it contrasts in the lax, cottony structure inside, that of *Ramalina* being firm and dense, and drying somewhat like noodles. *E. furfuracea* and *E. Cladonia* are more rigid, and have none of the yellowish tint usually seen in *E. prunastri*. The pointed tips distinguish it from nearly all members of Group 4, and all of Group 5.

Evernia furfuracea. SPROUT LICHEN.

Some botanists include this species in *Parmelia* (Group 5) and forms of it appear to belong there, for it varies greatly. On high mountains its whitish or silver-gray tufts, blackening at the base, reach a length of 15 cm. or more, while main stalks often spread 1 cm. wide. The under side is almost pure white near the tips, but browned or blackening in older parts, and marked with a net-like pattern of raised veins which blacken first. The outstanding character of *E. furfuracea* is a multitude of tiny "sprouts" usually less than 1 mm. long, standing out along the margins like broken teeth of a saw, while either scattered or densely massed over the upper surface of the stalks may be granules or tiny coral-like growths, giving a characteristic fuzzy appearance. The stalks fasten themselves at various points to the bark or wood, as Papery Lichens do, but the branches usually stand out nearly horizontally, 2 to 5 cm. or more from the foothold.

Fruits, very rare, are brown disks along the margins, up to 15 mm. across. Spores undivided, colorless, 5 to 8 by 3 to 5 microns.

Typical *E. furfuracea* can be distinguished from typical *E. prunastri* and *E. Cladonia* by a glance at the illustrations. Some smoother forms might be mistaken at first sight for the much more common *Parmelia physodes* and its close relative *P. vittata*, but the tips of these Shield Lichens are slightly swollen and often brown beneath, while those of the *Evernia* are white beneath, and paper-thin. The color and texture of *E. furfuracea*, especially in forms with dense, coral-like surface growth, suggest *Cetraria aleurites* (*Parmeliopsis aleurites*) (Group 5), which

however keeps its small tips lying close against the bark or wood, and so should not cause confusion.

Evernia Cladonia. ANTLER LICHEN.

Also called *Parmelia Cladonia* or *Evernia ceratodes* var. *Cladonia*. This Tuckerman considered a variety of *E. furfuracea*, but its typical forms look very different, resembling at first glance the Reindeer Mosses. It grows gracefully and profusely on branches and twigs of trees high in the Catskills, intermingled with *Parmelia physodes*. The growth, somewhat like a deer's antler, spreads and rises 3 to 4 cm. from the holdfast. On the main stalks, which are about 1 mm. in thickness, smooth and at times nearly round, a careful search will always show portions flattened and grooved with characteristic pale or blackening under-surface as in *E. furfuracea*, but rarely will any teeth, granules or coral-like growths be seen. Tips may be sharp pointed or more or less flattened. The general color is gray, but there may be a greenish tinge. All these characters vary enough so that occasional forms might be called either *E. Cladonia* or *E. furfuracea*. Fruits and spores, indistinguishable from those of *E. furfuracea*, are equally rare.

Evernia Cladonia can hardly be confused with any other lichen. The upward-pointing, smooth and often rounded branches distinguish it from *E. prunastri*, the presence of differently colored under-surface from Ramalina. From *Cladonia furcata* and *C. rangiferina*, which it resembles slightly, but which grow on the ground, it can always be distinguished by the fact that it grows only on trees and wood.

Physcia leucomela. BLACK-AND-WHITE LICHEN.

Also called *Physcia leucomelaena* or *Anaptychia leucomela*. It is unlikely that this southern species will be found in the New York area, yet it has been collected as far north as Albany, and may be again. Its dense, tangled tufts, as much as 10 cm. across, may be looked for on tree-bark, where, except for color, they suggest *Usnea*. The whitish or gray stalks, however, with straggling black hairs along their edges, distinguish it at once. There is a definite white under side to the flattened stalks, with a suspicion of down on it, and the edges curl downward. There is a tendency, rare in lichens, for the hairs to stand nearly

opposite along the stalks, though in some specimens this is hardly noticeable. Stalks and branches are of fairly uniform width, up to 2 mm., and the blunt tips are commonly bare of hairs.

Fruits, exceedingly rare in the north, on tips of branches, gray, with a whitish bloom, or nearly white, as much as 6 mm. across, with a ragged rim. The spores have a blackish tint characteristic of *Physcia*, and are plainly divided into two cells. Size 35 to 55 by 16 to 25 microns.

Most *Physcias* are stalkless Papery Lichens (Group 8), all easily separated from similar forms by the blackish, two-celled spores. They differ from *Parmelia* and *Cetraria* in the color of their fruits, which is never chestnut brown, but usually slate-gray or blackish, with a gray or white bloom, and dull rather than shining. In cases such as *Physcia leucomela*, where fruits are not expected, the shape and color of the lichen must determine it, and in this case they are sufficient.

Physcia ciliaris. FRINGED LICHEN.

Also called *Anaptychia ciliaris*. Much like *P. leucomela*, but found only north of the New York area. It differs in growing on rocks or soil rather than tree-bark, in its usually darker color, and in a tendency of the hairs to remain pale instead of blackening. As it is hardly ever found south of Canada, there is no need of describing it in detail.

Physcia comosa. BELL LICHEN.

Also called *Anaptychia comosa*. Another species rarely seen, but to be looked for on tree-bark. It is pale greenish gray. Though its stalks will seldom exceed 2 cm. in length, they broaden to as much as 2 mm. at the forks, and the hairs which border them are usually short and inconspicuous. The stalks, branches and tips look somewhat swollen, as do many *Physcias* (BLISTER LICHENS). The most distinctive character is the bell-shaped fruit, unique among local lichens. The stalk behind the fruit has a globular swelling, while the papery rim distends like the mouth of a bell.

Only a few lichens have hairs along the margins of stalks or lobes. Beside the *Physcia* species just described, the chief of these are: *Physcia hispida* (Group 8), *Cetraria ciliaris* (Group

4), *Parmelia perforata* and its near relatives (Group 6), all larger, broad-lobed lichens except *P. hispida* (*P. ascendens*), which does resemble *P. comosa* at first sight, but has tips swollen into large, whitish blisters, bursting outward, while the fruits grow on the upper surface of the lobes, not on the tips, and are not bell-shaped.

The hairs referred to must not be confused with the rather similar growths which spring from the under surface of many lichens, but which are root-like holdfasts. The hairs which in those few species fringe the edges of stalks and lobes, do not appear to be used for anchoring the lichen.

Cetraria islandica. ICELAND MOSS.

This is probably the most important of all lichens, long used in northern countries both for fodder and for human food. Though in the north it covers acres of otherwise barren ground, only a few scattered colonies are known in the New York area, on the Long Island coast, at the highest points of the Shawangunks, and occasionally elsewhere, mostly at high altitudes. Growing on the ground, *Cetraria islandica* (pronounced icelandica) forms tangled masses, usually about 5 cm. high, but sometimes twice as large, of shining brown, strap-shaped stalks and branches, commonly about 2 mm. but sometimes 1 cm. wide. These curl, especially in drying, so that the upper surface becomes a trough, the margins smooth or bordered with rather uniform spines 0.1 mm. or so in length. While the upper surface is not conspicuously different from the under, it is usually darker brown, sometimes almost black, and more shining. The under surface may show occasional wrinkles and channels, also tiny pits or round patches of gray soredia less than 0.3 mm. across.

Fruits rarely found so far south, are borne on enlarged tips, dark brown, oval or becoming irregular with age, up to 1 cm. and more across, the rims toothed. Spores simple, colorless, 5 to 11 by 3 to 6 microns.

So distinct is *Cetraria islandica* that no other ground lichen could be mistaken for it, except perhaps *C. hiaseensis*, for no other local upright species that grows on soil is shiny brown. This color, with the spiny margins, should serve for complete identification.



PLATE 3

- Fig. 1. *Evernia prunastri*, greenish or yellowish gray.
 Fig. 2. *E. prunastri*, upper surface showing warty soredia.
 Fig. 3. *E. prunastri*, under surface showing delicate veining
 Fig. 4. *E. furfuracea*, white, older parts blackening.
 Fig. 5. *E. furfuracea*, tips showing sprouts and granules.
 Fig. 6. *E. furfuracea*, under surface, showing darkened veins.

- Fig. 7. *E. furfuracea*, older portion with coral-like growths.
 Fig. 8. *E. Cladonia*, pale gray.
 Fig. 9. *Physcia leucomela*, whitish with black hairs.
 Fig. 10. *P. leucomela*, detail and section showing downward curled margin.
 Fig. 11. *P. comosa*, pale gray with short hairs.
 Fig. 12. *P. comosa*, showing bell-shaped fruits.
 Fig. 13. *P. comosa*, spores 2-celled and blackish.

Cetraria hiascens. CLEFT LICHEN.

Mentioned doubtfully, as it is not likely to be found within the area, but may grow under the same conditions as *C. islandica*. Its hue is paler brown or straw-color, and the manner of branching less complicated, but the distinguishing feature is seen in the tips, which, unlike the blunt branches of *C. islandica*, split into many fine, pointed divisions, giving an appearance more like the Reindeer Mosses (Group 2), but easily distinguished because the stalks are flat, and not hollow. As the under surface, though structurally different from the upper, does not appear so, it could be confused with *Ramalina calicaris* (Group 3), except for the fact that it grows on the ground, the *Ramalina* on trees.

The species of *Cetraria* (SHIELD LICHEN) which follow are often not actually stalked, but rise from their holdfasts by folds and wrinkles of their papery lobes, and are therefore closely akin to the Papery Lichens. Still other species of *Cetraria* which do not rise much above the foothold, will be found under Papery Lichens in Group 5, with *Parmelia* (also SHIELD LICHEN). Though it is not always easy to differentiate these two kinds of SHIELD LICHEN, *Cetraria* tends to raise its margins at least from the foothold, while *Parmelia* tends to lie more flat against it. The fruits of *Cetraria* spring from the edge of the lobe, while those of *Parmelia* lie on the upper surface, usually toward the center. *Cetraria* fruits have usually toothed or warty rims, while the rims in *Parmelia* are nearly always smooth. Both *Cetraria* and *Parmelia* have small, undivided, colorless spores, which distinguish them from most other Papery Lichens, *Sticta*, *Peltigera*, *Nephroma*, *Solorina* (Group 7), *Physcia* (Group 8), *Teloschistes*, *Caloplaca* (Group 9), *Collema* (Group 11).

Cetraria juniperina. CEDAR LICHEN.

Also called *C. viridis*. A frequent lichen in the pine barrens, and seen around upland bogs and ridges, growing on twigs and bark of White Cedar, or on other trees and wood. It forms a tuft of considerably divided papery lobes, wrinkled, pitted, veined, and the margins waved and crinkled. It will spread 5 cm. or more across, and rise 1 or 2 cm. from the foothold. The color may be olive green when wet, or yellow to greenish gray

when dry, sometimes edged with bright yellow dust (soredia). The under side is yellow or at least distinctly yellowish, silky and veined. The margins are often thickened and studded with raised blackish granules, which may also spread over the upper surface.

Fruits form on the margins, but so complicated is the structure that they may appear to cap irregular tubes thrust up from the center. The cupped or flat disk, up to 5 mm. across, may be smooth or wrinkled, chestnut brown, shining, and the rim broken, or toothed. Spores undivided, colorless, 4 to 8 by 4 to 5 microns.

Cetraria juniperina is conspicuous by its yellow under surface and yellow soredia, which distinguish it from other Papery Lichens in the New York area. The shade is never orange-yellow like *Teloschistes parietinus* or other members of Group 9, but rather a bright sulphur or bright greenish lemon yellow. No other local Papery Lichen which lifts itself from the foothold has a yellow under surface. It can be confused only with *C. pinastri* (Group 5), a closely related species, often considered a flat variety of it, found in the mountains and commonly on rocks. *C. pinastri* rarely or never fruits. *Sticta crocata* (Group 7) has dusty yellow sorediate margins, but a brown under surface.

Cetraria ciliaris. TENDRIL LICHEN.

Also called *Nephromopsis ciliaris*. Grows somewhat larger than *C. juniperina*, and is found with it on the bark or twigs of trees in pine barren swamps or upland bogs, or on fence-rails farther north. Tufts are sometimes 10 cm. across, but rise only 1 or 2 cm. from the foothold. The many crowded divisions, about 1 cm. across, spread outward, splitting into lobes with the margins much crinkled and again divided into smaller lobes, some not more than 1 mm. across. Along this complex margin, occasional black hairs will be seen, often not noticeable without a search. Numerous black granules are also usually set along the edge. The upper surface, greenish gray or sometimes brownish, is shallowly pitted in a net-like arrangement, or drawn into wrinkles, while a somewhat similar pattern on the whitish under surface is varied by root-like holdfasts, at first whitish. Older parts may brown and blacken.

Fruits, usually oval and up to 1 cm. across, appear along



PLATE 4

Fig. 1. *Cetraria islandica*, brown (olive green when wet).

Fig. 2. *C. islandica*, fructing tip. Fruits chestnut brown.

Fig. 3. *C. hiascens*, a finely divided tip.

Fig. 4. *C. juniperina*. Upper surface greenish. Under surface yellow.

Fig. 5. *C. ciliaris*, greenish gray with marginal hairs.

Fig. 6. *C. lacunosa*, spores.

Fig. 7. *C. lacunosa*, showing net-like pattern of veins with pits between.

Fig. 8. *C. stenophylla*. A fragment showing narrow stalks.

Fig. 9. *C. glauca*, showing some margins dusted with soredia, others forming coral-like growths.

Fig. 10. *C. saepincola*, chocolate brown (dark olive when wet).

Fig. 11. *C. saepincola*, fructing tip. Fruits chocolate brown.

the margin in such a way that some think they belong on the under surface turned upward, as in *Nephroma* (Group 7), a distinction which, even if true, seems hardly to justify the new genus *Nephromopsis*. Rims are toothed or warty. Spores undivided, colorless, 5 to 7 by 4 to 5 microns.

From the similar *C. lacunosa*, *C. glauca* and *C. stenophylla*, *C. ciliaris* can be distinguished by the marginal hairs. It has also a thinner substance, and more finely divided lobes. But these four species must be compared carefully to avoid confusion, as there are intermediate forms. *C. lacunosa* has the pitted surface more pronounced, and its fruits often show a conspicuous hole in the center. *C. stenophylla* has the lobes long and narrow. The under surface of *C. glauca* quickly turns shining brown and then black, its margins usually breaking into powdery white soredia or coral-like growths. The hair-margined *Parmelia perforata* and its relatives have much broader lobes which do not commonly divide smaller than 5 mm. across, and do not regularly rise high above the foothold. Other lichens with marginal hairs can be eliminated by a glance at the illustrations.

Cetraria lacunosa. LETTUCE LICHEN.

Commonly seen with *C. juniperina* and *C. ciliaris*, or rather more abundant than either on the highlands and in pine barren swamps, where its larger tufts on bark and twigs look like miniature lettuce. It may grow more than 10 cm. across, rising 2 or 3 cm. from the foothold. Lobes are often as broad as high, but with the margins usually more or less divided and crinkled. The net-like pattern of wrinkles with pits between is more pronounced than in any other species of this group. The substance is rather thick and stiff, like thick paper. The margins and often large areas of the surface are usually dotted with conspicuous black granules. The color varies from greenish gray to rather dark green or brownish (greener when wet, as in most lichens), while the under surface is characteristically white, but sometimes turning brown or jet black on the older parts. There are few or no visible holdfasts.

Brown fruits up to 1 cm. across, of round, oval or irregular shape, grow frequently close to the margins, but these clearly spring from the upper, not the under surface, and are sometimes seen on short stalks 2 or 3 mm. from the margin. Large

fruits often have a hole in the center. The rim is usually rather smooth and thin. Spores undivided, colorless, 5 to 8 by 4 to 5 microns.

Cetraria lacunosa usually rises higher from the holdfast than its close relatives (discussed under *C. ciliaris*), but resembles them so closely that several points should be checked over. Hairs on the margin would make it *C. ciliaris* if narrow-lobed, or if broad-lobed, *Parmelia perforata*, a yellow under surface *C. juniperina*, white soredia on the margins *C. glauca* or a *Parmelia*, stalks and lobes all narrower than 5 mm. *C. stenophylla*. Other common lichens with conspicuous net-like pattern of wrinkling are *Parmelia saxatilis* and *P. sulcata* (Group 6) *Sticta pulmonaria* and *S. sylvatica* (Group 7), both larger and much less upright.

Cetraria stenophylla. SLENDER SHIELD LICHEN.

Also called *C. lacunosa* var. *stenophylla*. Though differing from *C. lacunosa* in nothing except the narrow lobes, typical specimens are so distinct in appearance that they would be taken for a wholly different lichen. No one has attempted to say just how narrow *C. lacunosa* must be before it is *C. stenophylla*, so let us say arbitrarily that no stalk, branch or lobe of *C. stenophylla* should be anywhere wider than 5 mm.

Forms which appear to be *C. stenophylla* sometimes show characters belonging to *C. glauca*, such as white dusty (sorediate) margins, or coral-like growth. For these Tuckerman named also a var. *stenophylla* for *C. glauca*, but his solution is not satisfactory. The truth is, lichens do not always divide sharply into their different forms, but have intermediates in astonishing variety. Certain names therefore must be applied arbitrarily and with slightly indefinite limits, if we are to name these highly variable plants at all.

Cetraria glauca. PALE SHIELD LICHEN.

Less common than related species, but to be looked for in similar places, on living trees or dead wood. The character for which it is named, a bluish gray (glaucous) color, appears also in *C. lacunosa*, which it resembles in many ways. Tufts may be 10 cm. or more across, but do not commonly rise more than about 2 cm. from the foothold. Lobes may be 2 or 3 cm. broad

and often not much divided, with margins frequently breaking into dusty white soredia or extended into coral-like growths. A little of the under surface may be whitish near the tips, but it is more likely to be shining brown there, jet black farther down.

Fruits much like *C. lacunosa*, but somewhat larger, and without the hole in the center, occur very rarely. In their absence, *Cetraria glauca* can be mistaken for *Parmelia perlata* (Group 6), which also fruits rarely, but is of a darker color, larger size, with broader, simpler lobes, which though often margined with soredia, do not develop coral-like growths. *P. perlata* is commonly found on rocks, *C. glauca* on trees. If any marginal hairs are present, a lichen of this nature is almost surely *P. perforata*, which grows on trees. (For distinctions within this group, see *C. ciliaris*.)

Cetraria saepincola. CHOCOLATE SHIELD LICHEN.

This small species, rarely spreading more than 3 or 4 cm., or rising more than 5 mm. from the twigs and tree-bark on which it grows, has a characteristic chocolate brown color, sometimes shading to olive green or blackish, especially when wet, shared by few local lichens. It inhabits the Shawangunks and mountain crests to the north. When well developed, it forms loose, irregular, wrinkled tufts, like *C. juniperina* in miniature, but is often reduced to a few fruits clustered on a twig, almost no stalks or lobes visible. Even in larger forms, the lobes are rather simple, smooth and not intertangled. The under surface is paler brown.

Fruits, up to 4 mm. across, usually plentiful, are chocolate brown like the rest of the lichen, and seat tightly against the upper margins, with a slightly toothed rim. Spores undivided, colorless, 6 to 9 by 3 to 6 microns.

C. fahlunensis, (Group 5), with similar color, but longer lobes and few fruits, grows only on rocks. The only other brown papery lichen of comparable size on local trees, is the rather common *Parmelia olivacea* (Group 5) and its varieties or subspecies, usually olive-brown or brassy, lying flat against the bark, and seldom fruiting. It can be distinguished by its mostly black under surface. The brown lichens in Group 7, *Sticta*, *Peltigera*, *Nephroma*, and in Group 12, *Umbilicaria* and *Dermatocarpon*, are mostly much larger and wholly different lichens, none of them with the chocolate shade.

Groups 1 to 4 include all the principal Stalked Lichens which can be expected in the New York area, with the exception of a very few small and rare ones offering special difficulties. The last species of *Cetraria* are not exactly stalked, and there are included in the Papery Lichens (Groups 5 to 12) a few species perhaps comparable in form, as already noted. In Group 11 are some highly variable forms difficult to classify, and kept together because their algal parts, mostly *Nostoc*, give them a characteristic water-soaked or gelatinous appearance in shades of black, dark green, dark brown and blue-gray, very different from the greenish gray or yellow tints of most of the larger lichens.

RIDGEWOOD, N. J.

An apparent double-sporophyte in *Polytrichum commune* L.

HENRY N. ANDREWS, JR.

Although the occurrence of abnormalities, such as "double-sporophytes," in the mosses is not common, judging from the accounts of the relatively few students who have concerned themselves with them, one would expect that more careful field examination of large numbers of individuals would bring to light more numerous cases. The relatively inconspicuous nature of the moss habit is probably the chief reason for the few cases on record.

Györfy (1934) and Schimper (1861) have described and illustrated double-sporophytes in several genera of mosses including *Orthotrichum*, *Homalothecium*, *Anomodon*, *Bryum*, *Brachythecium*, *Mnium*, and *Buxbaumia*. In all of these cases the two thecae have a common seta—division of the latter taking place well above its point of union with the gametophyte. The specimens described by these authors appear to have been collected when mature and after the calyptra had been lost—at least there is no mention of the latter in their accounts. As will be shown below the calyptra may be of considerable significance in determining the true ontogenetic morphology of the teratological form in question.

The two most plausible explanations of this phenomenon are